

NEW MILLENNIUM PROGRAM

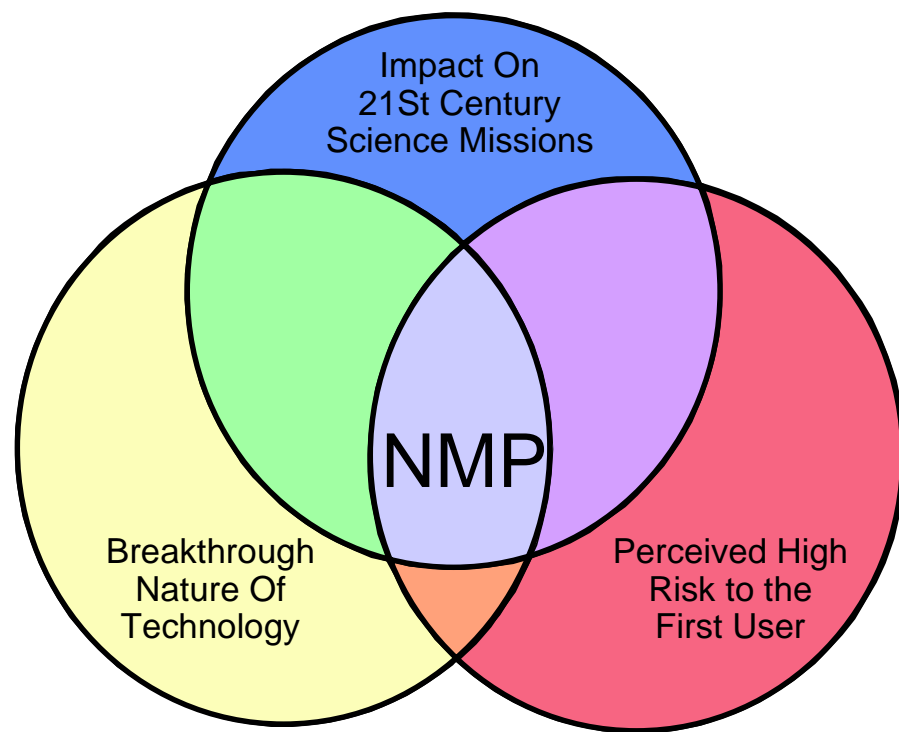
New Millennium Program Overview

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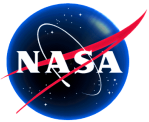
August 23-24, 2000

New Millennium Program

A cross-Enterprise program to identify and flight validate breakthrough technologies that will significantly benefit future Space Science and Earth Science missions

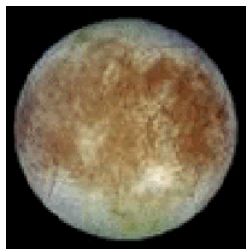


- Breakthrough technologies
 - Enable new capabilities to meet Earth and Space Science needs
 - Reduce costs of future missions
- Flight validation
 - mitigates risks to first users
 - enables rapid technology infusion into future missions



Space Science Strategic Plans Drive the Technology Validation Needs

Strategic Plans /Technology Roadmaps



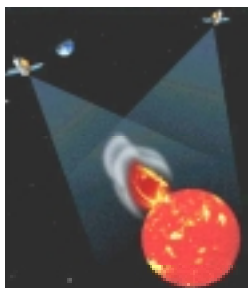
**Solar System
Exploration (SSE)**



**Astronomical
Search for
Origins (ASO)**



**Structure & Evolution
of the Universe
(SEU)**



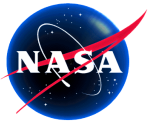
**Sun Earth
Connection (SEC)**

**Future Missions
Technology Needs**

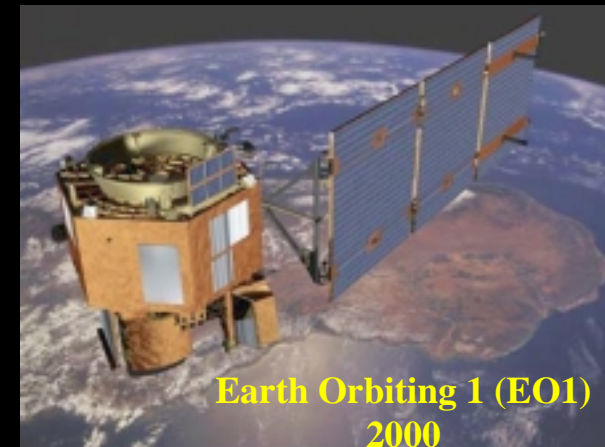
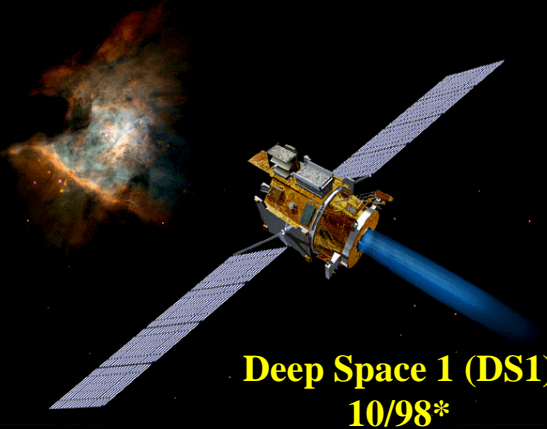
**Technology Development/
Availability**

**Space Science
Technology
Validation Needs**

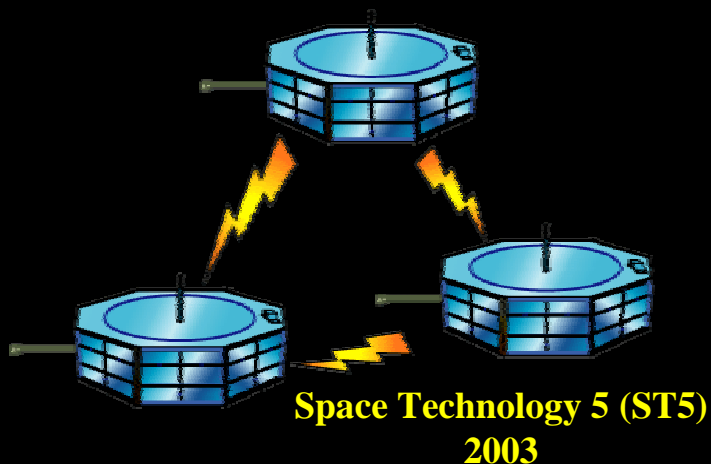
TECHNOLOGY PIPELINE



Program Overview



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ST5 Nanosat Constellation Trailblazer Mission

Miniature Spacecraft

- Systems Design Integration and Test Technologies

Candidate Spacecraft Technologies

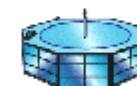
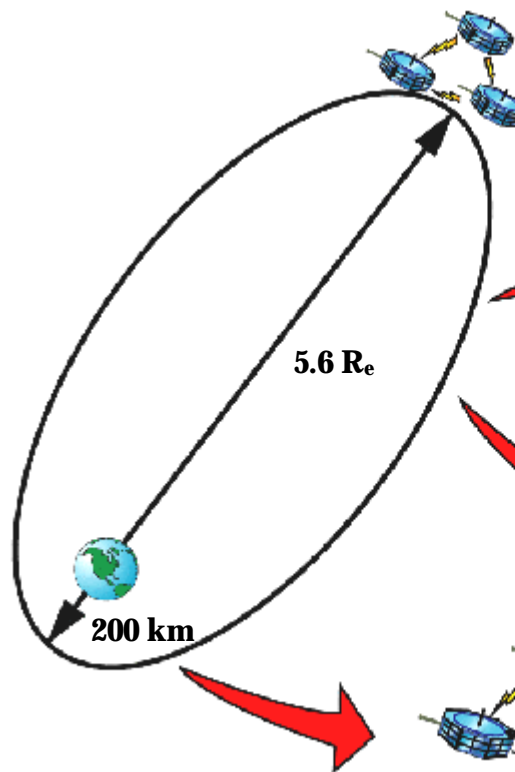
- 5V bus - 1/4V logic
- Li-Ion batteries
- Miniature transponder
- Miniature Thrusters
- Multi-functional structure
- Variable emittance coatings

Constellation Control, Coordination, and Operations Architecture

- Ground system autonomy
- Relative ranging
- Intra-constellation communications

Constellation Class Missions

Simultaneous, Multipoint, In-Situ Characterization of the Magnetosphere



Single Nanosats and Probes
Reduced Risk Small Spacecraft Bus for Low Cost Missions

Virtual Platforms
For Science Missions

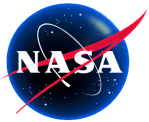
TECHNOLOGY



VALIDATION



INFUSION



Key Program Attributes

Technology -
Focused Projects

Phase A

Phase B

Technology - Focused Project
Formulation Process

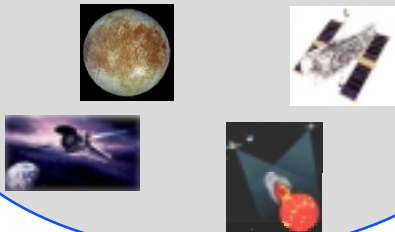
- Ensures focus on technology needs of future science missions

Breakthrough
Technologies Requiring
Flight Validation

Phase A

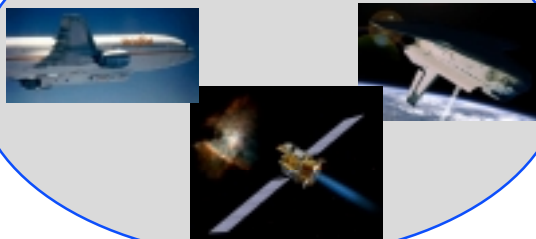
- Open competitive technology calls
- Strong rationale for flight validation

Multi-Mission
Technology Benefits



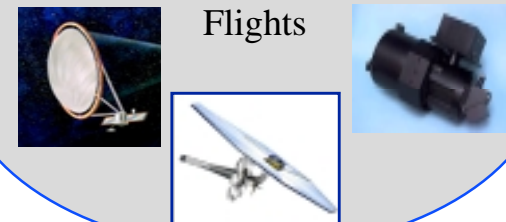
- Broad user community

Partnership /
Shared Launches



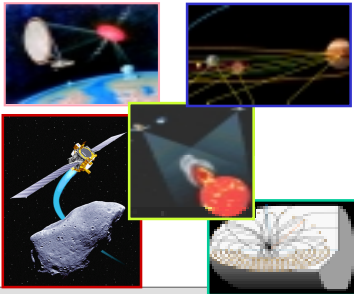
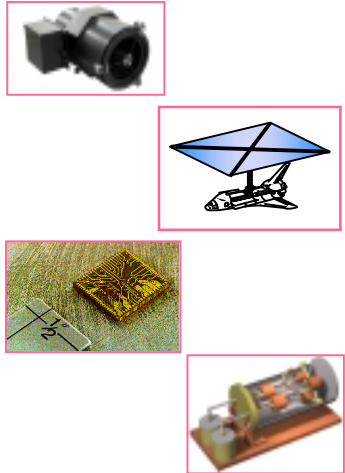
- Increases launch opportunity
- Reduces “low tech” elements’ costs

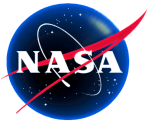
System/Subsystem
Approaches with Frequent
Flights



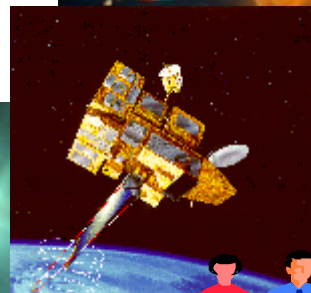
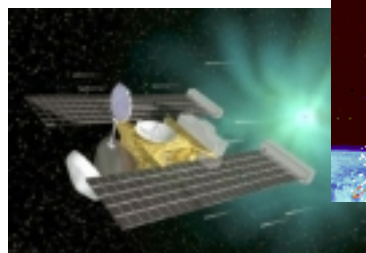
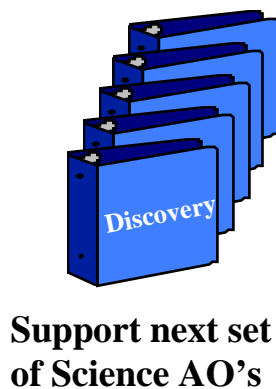
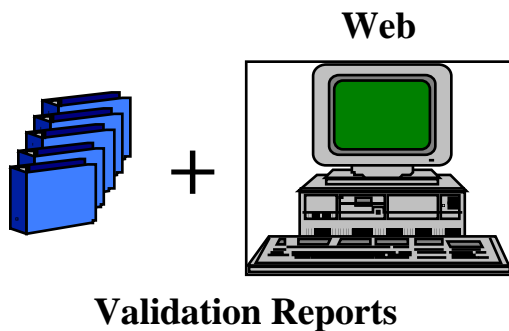
- Maximizes cost effectiveness of validation approach
- Balanced portfolio
- Flexible / adaptive / resilient

New
Millennium
Program

	Approach	Project Attributes
System Validation 	<p>Suites of new technologies to enable new system capabilities by performing critical system-level functions in a flight validation project</p>	<ul style="list-style-type: none"> Balanced mix of small and medium projects <ul style="list-style-type: none"> Small (the normal): \$50M class project with shared launches Medium (occasional): \$100-\$150M class project Yearly launches of system validation project
Subsystem Validation 	<p>Subsets or components of systems are flight validated as “stand-alone” technology subsystems on flights of opportunity and NMP technology carriers</p>	<ul style="list-style-type: none"> Yearly flight opportunities for several subsystems as technology items on flights of opportunities or technology carrier \$25M class technology subsystem projects (multiple subsystem items per project) Partnership for flights of opportunity NASA hosts technology carrier every 3 years - \$15M-class carrier plus launch



Technology Validation Information Dissemination Activities



Benefits of NMP Processes

- Infusion into future science missions
 - Future strategic missions using NMP validated technologies
 - Technology available for NASA AOs
 - New capabilities enable new opportunities
 - MIDEX/SMEX/Discovery/ESSP
- Enhanced NASA's technology community through partnerships
 - Industry
 - Academia
 - Government Laboratories

